Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
	)	
The Development of Operational,	)	
Technical and Spectrum Requirements	)	
For Meeting Federal, State and Local	)	WT Docket No. 96-86
Public Safety Agency Communication	)	
Requirements Through the Year 2010	)	
	)	
Establishment of Rules and Requirements	)	
For Priority Access Service	)	

Comments of M/A-COM

M/A-COM, a division of AMP, Inc. submits these comments in response to the Notice of Proposed Rulemaking ("Notice"), FCC 97-373, released October 24, 1997, in the above-captioned proceeding.

Summary of Position

M/A-COM supports a transmit/receive separation of 30 MHz for the 746-806 MHz band by public safety licensees. This specification is consistent with good engineering practice and with operations on adjacent frequency bands.

M/A-COM supports a channelization of 25 kHz for public safety operations in the 746-806 MHz band. Such a bandwidth, coupled with a required data rate of 19.2 kbps in a 25 kHz channel, provides the best compromise between voice and data transmission needs, and also provides the best means for supporting increased data transmission needs in the future.

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M/A-COM's Interest In This Proceeding

M/A-COM is a world leader in the design and manufacture of RF, microwave and millimeter wave materials, devices, components and subsystems. Our solutions (which include discrete semiconductors, ICs, multi-function assemblies, cables, connectors and antennas) are already hard at work in thousands of government and high volume commercial applications around the world, from cellular phones to wireless LANs, PCS base stations to advanced automotive electronics, and satellite systems to navigation systems. With decades of microwave experience and a heavy commitment to R&D, we are able to provide our partners with the solutions today's market demands. In June 1995, M/A-COM merged with and is now a division of AMP, Inc., Harrisburg, PA.

As described in the Attachment, M/A-COM manufactures and supplies dual mode mobile radios used by private mobile radio networks such as Federal Express. These radios operate on private mobile frequencies during normal operations, but during peak periods can "overflow" onto commercial radio frequencies, thereby providing both spectral efficiencies and economic efficiencies to private radio licensees. We believe such an approach will be attractive to public safety licensees in the 746-806 MHz bands.

Transmit/Receive Separation of 30 MHz Should Be Adopted

M/A-COM supports a transmit/receive separation of 30 MHz for mobile operations in the 746-806 MHz band. It is well understood that for frequency division duplex operations, filtering is needed to prevent transmissions from leaking back into the receiver and causing interference. A transmit/receive separation that is too narrow requires the use of relatively more expensive filters, thereby raising equipment costs without any countervailing benefits. Considering that the Commission proposes to reallocate a total 60 MHz of broadcast spectrum in response to statutory requirements (Notice, para. 2), a 30 MHz

transmit/receive separation would appear to be the most practical for both the 24 MHz dedicated to public safety uses and the remaining 36 MHz intended for commercial use.

However, should the Commission decide that the commercial spectrum will not be used in a frequency division duplex manner, then it would also be practical to employ a channel plan with 746-758 MHz and 794-806 MHz dedicated to public safety use (48 MHz transmit/receive separation) with the 758-794 MHz band dedicated to commercial use.

Channel Spacing of 25 kHz Should Be Adopted

M/A-COM believes that a channel spacing of 25 kHz should be adopted in this proceeding, both for interoperability (Notice, para. 61-66) and for general service (Notice, para. 132-139). Such a channel spacing would be the best compromise for carrying both voice and data communications.

In order to improve the efficiency of single channel voice communications, the FCC has recently gone to narrower channel spacing, ranging from 12.5 kHz to 6.25 kHz and 5 kHz. However, decisions to adopt such narrow spacings have not fully considered the growing demand for mobile data communications by public safety agencies.

Higher data rates than are commonly used today will soon be needed for image transmission. NCIC 2000, for example, involves the addition of finger print and mugshot information to a data base that previously held license plate and driver's license information. It is very likely that police agencies will request the transmission of mugshots over the radio channel to laptops in the vehicles. While these files are relatively modest in size, i.e. a few kilobytes if JPEG encoded, they are still huge in comparison to the license plate inquiries transmitted today, and will result in a substantial increase in both the volume of data traffic and the need for a higher bit transmission bit rate to provide reasonably quick information transfer.

Most public safety agencies in the U.S. today have data systems which operate at a raw bit rate of only 4800 bps in a 25 kHz channel. At this bit rate it requires something in excess of 15 seconds to transfer a 4 kbyte file over a radio channel, and during this period no other vehicle has access to the channel. However, the technology exists to support 19.2 kbps in a 25 kHz channel, and this should be required as the minimum bit rate supplied by equipment operating with a 25 kHz channelization. A 25 kHz channel would support 2 voice calls today using TDMA, and in the future this would increase to 4 voice calls.

A 6.25 kHz FDMA channelization is inefficient because it does not permit adequate data rates for image transmission. We oppose a channelization of 6.25 kHz.

A significant advantage of the TDMA approach suggested above is that data packets can be transmitted in the gaps between voice push-to-talk ("PTT") spurts, dramatically increasing the efficiency with which the channels are used. For example, assuming that the voice channels (or time slots) are trunked on a call basis using message trunking, the voice channel is reserved for the call between PTT spurts. It is possible to transmit data packets during this period. A single 25 KHz channel can support two voice calls and an average of 9600 bps data, by transmitting the data during the gaps between voice PTT spurts. This efficient integration of data and voice is only possible in the TDMA approach, and is not possible with the narrower channelizations.

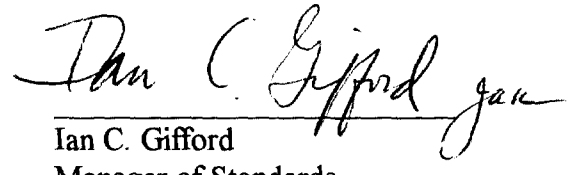
Another advantage of the TDMA approach is that a single base station supports several voice time slots and data messaging, reducing the system infrastructure cost.

In the future, there will be demand for slow motion video and other multimedia information be transmitted to or from police and other public safety vehicles. Even with significant image compression the minimum required bit rates are in the 100 kbps range. This can be accomplished by consolidating perhaps four adjacent 25 kHz channels. For this reason, while the standard channel spacing should be 25 kHz, users should be permitted to combine adjacent channels to support these higher bit rate applications.

Conclusion

In light of these considerations, the Commission should adopt a 30 MHz transmit/receive separation and 25 kHz channel spacing for public safety operations in the 746-806 MHz band. The FCC should require a minimum data transmission rate capability of 19.2 kbps in a 25 kHz channel.

Respectfully submitted,



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ATTACHMENT

M/A-COM's DUAL MODE MOBILE RADIO

M/A-COM Communication Technologies Center (CTC) has developed and is currently shipping a PLMRS network that provides packet switched data and push-to-talk digital voice services. The packet switched network supports end-to-end TCP/IP protocols between fixed wired networks and mobile data terminals. M/A-COM is building the radio/modems and supporting infrastructure products. Our radios support both the 800 MHz SMR bands and the AMPS/CDPD bands. The RF channel data rate is 19.2 kbps. This equipment is ideally suited for deployment of private packet data & digital voice networks.

M/A-COM's dual band mobile radio architecture includes an I/Q interface to a pair of Digital Signal Processors, which handle the physical, media access, and higher layers of the software stack. The processors also support AMBE digital voice, and the radio includes a voice microphone and speaker. An RS-232 connector is provided for interface to a laptop computer or mobile data terminal. In other words one radio supports both Data and Voice (push-to-talk) and multiple air interfaces.

The Private Network Protocol (PNP) protocol combines the upper layers of the CDPD software stack with new physical and media access layers, which provide 19.2 Kbps data transmission in a 25 kHz SMR channel (or 9.6 Kbps in a 12.5 kHz SMR channel). The interface to the software application is TCP/IP, and the software application simply sees a CDPD software stack - the new physical and media access layers required to support the SMR channels are transparent to the software applications.

The M/A-COM radio will also support CDPD v1.1 on the AMPS cellular band, under software control. This allows the mobile radio to roam between private channels using PNP and public channels using the CDPD protocol. It is intended that a future upgrade will include AMPS cellular voice support, providing direct access to the public switched telephone network. The addition of an eight (8) channel GPS position location module to the radio as a factory configurable option is available now in 1997.

The PNP system uses digital techniques and a new packet communications protocol based on TCP/IP, which provides a significant improvement in channel access arbitration under heavy load conditions. The PNP system allows concurrent voice and data transmissions over a single channel. In this mode, half of the channel capacity is given to support a single voice call whilst the remainder continues to carry data transmissions from other users. Two simultaneous voice transmissions are not permitted ensuring the availability of channel bandwidth for data transmission. PNP voice is transmitted digitally using a process called Advanced Multi-Band Excitation (AMBE) (TM), a method of digital voice compression licensed from a third party. The technique provides noise-free audio and supports voice grouping whereby voice communications are only heard by other users

sharing the same voice group and private communication is possible between a courier and dispatcher. When a voice transmission is occurring, PNP still provides at least twice the total capacity of the customers legacy network protocol for simultaneous data from another user.